4.9 Hydrology and Water Quality

This section of the EIR describes the potential physical environmental effects related to the issue of hydrology and water quality resulting from development of proposed CIP projects under the Master Plans.

As discussed in Chapter 4, Environmental Analysis, the following CIP projects have been adequately addressed in previous CEQA documents and are not included in this analysis: Sewer CIP Projects SR-6, SR-10, SR-25, N-1, N-2, N-5, N-7, N-8, N-10, N-11, I-3, I-4, I-5, and I-6; Water CIP Projects 7, 8, 40, and R6; and Recycled Water CIP Projects ES3.

4.9.1 Environmental Setting

4.9.1.1 Hydrology

The sewer, water, and recycled water service areas are located within the Carlsbad Hydrologic Unit (Figure 4.9-1). The Carlsbad Hydrologic Unit is bound by the San Luis Rey Hydrologic Unit to the north, the San Dieguito Hydrologic Unit to the east and south, and the Pacific Ocean on the west. In its entirety, the Carlsbad Hydrologic Unit covers approximately 210 square miles, and includes the cities of Oceanside, Carlsbad, Leucadia, Encinitas, Cardiff-by-the-Sea, Vista, and Escondido. It is divided into six hydrologic areas: the Loma Alta, Buena Vista Creek, Agua Hedionda, Encinas, San Marcos and Escondido Creek. Drainage within the Carlsbad Hydrologic Unit is generally to the west and southwest through drainage channels into lakes or lagoons, all which eventually flow into the Pacific Ocean. Major drainages of this hydrologic unit are shown in Figure 4.9-1 and include the Buena Vista Creek, Agua Hedionda Creek, San Marcos Creek and Escondido Creeks. Major water bodies within this watershed include Lake Wohlford and Dixon Reservoir, in the upper reaches of the watershed, and Olivenhain Reservoir in lower portions of the watershed. The Carlsbad Hydrologic Unit also has four major coastal lagoons, including the Buena Vista Lagoon, Agua Hedionda Lagoon, Batiquitos Lagoon and San Elijo Lagoon. Almost half of the Carlsbad Hydrologic Unit is urbanized with dominant land uses including residential, commercial, industrial, freeways and roads, agriculture, and vacant or undeveloped land (Project Clean Water 2012).

4.9.1.2 Water Quality

This section defines common water quality contaminants and describes existing surface water quality issues within the sewer, water, and recycled water service areas.

Water Quality Contaminants

Metals

Metals can impact surface water quality by accumulating in sediments and fish tissues. This poses risks of toxicity such as lowering the reproductive rates and life spans of aquatic animals and animals up the food chain. Metals can also alter photosynthesis in aquatic plants and form deposits in pipes. Metals in urban runoff can result from automobile use, industrial activities, water supply infrastructure corrosion, mining, or pesticide application. Atmospheric deposition can also contribute metals to water bodies. Groundwater can be contaminated from metals from improper disposal of waste generated from small businesses such as automobile repair shops or metal parts cleaning operations.

Nutrients (Phosphorous and Nitrogen)

High levels of nitrogen and phosphorus in surface waters can produce harmful algal blooms. In turn, these blooms can produce "dead zones" in water bodies where dissolved oxygen levels are so low that most aquatic life cannot survive. Typical sources of nutrients in surface waters are improper fertilizer usage (both agricultural and residential), discharges from failing or improperly maintained septic systems, and accidental sanitary sewer overflows. Nitrate, which is composed of nitrogen and oxygen, occurs naturally in soil and water. Nitrate is an important constituent in fertilizers used for agricultural purposes and is present in human and animal wastes. Typical sources of elevated nitrates in groundwater are failing septic tanks, feed lots, or farming operations. Infants, young livestock, and pets are extremely susceptible to potential health effects from drinking water with nitrates above regulated levels and could become seriously ill. If untreated, the condition can be fatal.

Petroleum Products (Gasoline, Diesel, Oil and Grease)

Gasoline, diesel, oil, and grease are characterized as high molecular weight organic compounds. Primary sources of gasoline, diesel, oil and grease contaminants are motor products from leaking vehicles and underground storage facilities and tanks. Petroleum hydrocarbon products commonly found in gasoline, including benzene, toluene, ethylbenzene, xylene, and methyl tertiary butyl ether (MTBE), are considered common petroleum contaminants to surface water and groundwater. Benzene is used as a gasoline additive, industrial solvent and in the production of drugs, plastics, rubber and dyes. Toluene is widely used as an industrial feedstock and as a solvent. Ethylbenzene is used in the production of plastic while xylene is used as a solvent in the printing, rubber and leather industries. MTBE is a gasoline additive that has historically caused groundwater contamination from spills or leaks at gas stations. Additional sources of oil and grease include esters, oils, fats, waxes, and high molecular-weight fatty acids. Introduction of these pollutants to water bodies is typically due to the widespread use and application of these products in municipal, residential, commercial, industrial, and construction areas. Elevated oil and grease content can decrease the aesthetic value of a water body, as well as its water quality.

Pathogens (Bacteria and Viruses)

Water contaminated with pathogens such as bacteria and viruses can introduce diseases to humans and animals. This can have significant public health implications, particularly related to water used for drinking and recreational uses such as swimming, surfing, and shellfish harvesting. Common sources of pathogens in surface water include wild and domesticated animals, urban and agricultural activities, and accidental sanitary sewer overflows. Elevated bacteria in groundwater occur primarily from human and animal wastes. Sources of bacteriological contamination include septic tanks, natural soil/plant bacteria, feed lots, pastures, and other land areas where animal wastes are deposited. Old wells with large openings, including hand dug wells and wells with inadequate seals, are most susceptible to bacteriological contamination from insects, rodents, or animals entering the well.

Pesticides and Herbicides

Pesticides and herbicides can enter surface water and groundwater from both agricultural and urban areas. Typical impacts include accumulation in sediments and bioaccumulation in the food chain. Pesticides and herbicides can be toxic to both aquatic life and humans.

Sediments

Increased sedimentation, over and above the amount that enters the water system by natural erosion, can cause many adverse impacts on aquatic organisms, water supply, and wetlands. Sedimentation can decrease transmission of light, which affects plant production and leads to loss of food and cover for aquatic organisms. It can change behavioral activities (nesting, feeding, mating), and adversely affect respiration, digestion, and reproduction. Contaminants and toxic substances can also be transported in sediments. Sediments can damage water treatment equipment, increasing treatment costs. They can reduce reservoir volume and flood storage and increase peak discharges.

Total Dissolved Solids

Total dissolved solids (TDS) refer to the total concentration of all minerals, salts, metals, cations or anions that are dissolved in water. TDS is composed of inorganic salts (principally calcium, magnesium, potassium, sodium, bicarbonate, carbonate, chloride and sulfate), and some small amounts of organic matter that are dissolved in water. The primary source of TDS in groundwater is the natural dissolution of rocks and minerals, but septic tanks, agricultural runoff, and storm water runoff also contribute. Increased salts in regional freshwater resources from mining, urban runoff, and construction can create stressful environments and even destroy habitat and food sources for wetland animals in aquatic and wetland habitats, as well as favoring salt tolerant species; reduce the quality of drinking water; and may cause skin or eye irritations in people.

Surface Water Quality

The following discussion identifies surface water quality issues in the Carlsbad Hydrologic Unit. Additional information, including water quality objectives, implementation strategies, plans and policies, and surveillance, monitoring and assessment information, for each watershed management area discussed below can be found by accessing the San Diego Basin Water Quality Control Plan (Basin Plan) available at the State Water Resources Control Board (SWRCB) website: http://www.swrcb.ca.gov/.

Major impacts to the Carlsbad Hydrologic Unit include surface water quality degradation, sewage spills, beach closures, sedimentation, habitat degradation and loss, invasive species, and eutrophication. The water bodies in the Carlsbad Hydrologic Unit that have been placed on the CWA 303(d) list are shown in Table 4.9-1. Pollutant conditions in the Carlsbad Hydrologic Unit include bacterial indicators, eutrophic conditions, nutrients, sediments, sulfates, nitrates and phosphates. The sources of these pollutants are varied and include urban runoff, agricultural runoff, sewage spills, livestock/domestic animals, and other natural sources. Each impaired lagoon listed in Table 4.9-1 is also identified in the San Diego Regional Water Quality Control Board Investigation Order and Technical Report for Lagoons Total Maximum Daily Load Project - Order No. R9-2006-0076, which establishes monitoring requirements for dischargers. This order required monitoring to begin during the 2007-2008 wet weather monitoring season.

As identified in the Basin Plan, the designated beneficial uses for Buena Vista Creek, Agua Hedionda Creek, San Marcos Creek, and San Luis Rey River may include the following:

- Municipal and domestic supply
- Industrial service supply
- Non-contact recreation
- Cold freshwater habitat
- Rare, threatened and endangered species
- Agricultural supply
- Contact water recreation
- Warm freshwater habitat
- Wildlife habitat
- Hydropower Generation

Table 4.9-1 Water Bodies Indentified as Impaired under the Clean Water Act

Water Body Name	Pollutant/Stressor
Agua Hedionda Creek	Manganese, Selenium, Sulfates, Total Dissolved Solids
Buena Creek	DDT, Nitrate, Phosphate
Buena Vista Creek	Sediment Toxicity
Buena Vista Lagoon	Indicator bacteria, Nutrients, Sedimentation/Siltation
Cottonwood Creek (San Marcos)	DDT, Phosphorus, Sediment Toxicity
Encinitas Creek	Phosphorus
Escondido Creek	DDT, Manganese, Phosphate, Selenium, Sulfates, Total Dissolved Solids
Loma Alta Slough	Eutrophic, Indicator bacteria
Pacific Ocean Shoreline, Buena Vista Creek	Indicator bacteria
Pacific Ocean Shoreline, Escondido Creek	Indicator bacteria
Pacific Ocean Shoreline, Loma Alta	Indicator bacteria
Pacific Ocean Shoreline, San Marcos	Indicator bacteria
Reidy Canyon Creek	Phosphorus
San Elijo Lagoon	Eutorphic, Indicator bacteria, Sedimentation/Siltation
San Marcos Creek	DDE, Phosphorus, Sediment Toxicity
San Marcos Lake	Ammonia as Nitrogen, Nutrients, Phosphorus

Source: SDCK 2012

Beneficial uses for Buena Vista, Agua Hedionda, and Batiquitos Lagoons may include the following:

- Contact water recreation
- Commercial and sport fishing
- Wildlife habitat
- Marine habitat
- Migration of aquatic organisms
- Preservation of Biological Habitats of Special Significance
- Spawning, Reproduction, and/or Early Development
- Non-contact recreation
- Estuarine habitat
- Industrial service supply
- Aquaculture
- Shellfish harvesting
- Rare, threatened and endangered species
- Warm freshwater habitat

4.9.1.3 Flood Hazards

Flooding is a general or temporary condition of partial or complete inundation of normally dry land areas near water. Flooding is associated with precipitation, development, faulty drainage facilities, dam inundation, tsunamis or seiches. These flood hazards are discussed below.

Precipitation Induced Flooding

Mudflows are shallow water-saturated landslides that travel rapidly down slopes carrying rocks, brush, and other debris. Mudflows are a relatively common occurrence in San Diego. A mudflow occurs naturally as a result of heavy rainfall on a slope that contains loose soil or debris. Human activity can also induce a mudslide, such as when soil becomes saturated from a broken water pipe or incorrect diversion of runoff that saturate soil. The path of a mudflow is determined by local topography, and will

typically follow existing drainage patterns. The fluidity and depth of the water/soil/debris mixture and the steepness of a channel are all variables that influence the rate of movement of a mudflow. Mudflows are identified as significant hazards in the San Marcos General Plan; however, the portion of San Marcos within the study area has a low susceptibility for landslides and mudflows.

Development

The conversion of undeveloped, natural areas to urbanized uses throughout San Diego's watersheds have contributed to increased potential for flooding by increasing the rate and amount of runoff in a watershed and altering drainage patterns. Construction of impervious surfaces such as structures, roads and driveways reduces the amount of rainfall that can infiltrate the ground surface and move to the subsurface. As a result, the volume of surface water runoff increases within a watershed; subsequently, artificial conveyances such as gutters, storm pipes and natural channel improvements to accommodate additional volume accelerate the rate of flow of water in the watershed. This faster moving, higher volume of surface water runoff within a watershed results in a higher probability and increased severity of flooding within a watershed, if facilities are not adequately maintained or constructed to carry peak flow capacity.

Any alteration to natural drainage patterns by modifying landforms that control the conveyance of surface water can increase the potential for flooding. Grading or other modifications, including directly altering the course of a stream or river by excavation or embankment, can increase velocities of floodwaters, which increases the potential for flooding downstream of the modification. A reduction in the capacity of the watercourse can increase the potential for flooding at the site of the modification as well as upstream from the activity.

Faulty Drainage Facilities

Drainage facilities including storm drains, culverts, inlets, channels or other such structures are designed to prevent flooding by collecting storm water runoff and directing flows to either the natural drainage course and/or away from urban development. The capacity of a drainage structure can typically be adequately determined by a hydrology and drainage study; however, if drainage facilities are not adequately designed or built, or properly maintained, the facilities can overflow or fail, resulting in flooding.

Dam Failure

Dam failure inundation is caused by the release of impounded water from structural failure or overtopping of a dam. The failure of a dam occurs most commonly as a result of extreme rainfall, poor design, neglect, or structural damage caused by earthquakes. This event is extremely hazardous, as it will typically occur quickly and without warning. Areas directly below the dam are at the greatest risk, and as the water moves farther downstream and reduces in velocity and depth, the magnitude of the damage and potential risk to life and property decreases.

The San Diego Multi-Jurisdictional Hazard Mitigation Plan identifies dam failure risk levels (high, significant, low) based on dam inundation map data. A simple way to define high risk of dam failure is if failure of the dam is likely to result in loss of human life. Most dams in San Diego County are greater than 50 years old and are characterized by increased hazard potential due to downstream development and increased risk due to structural deterioration and inadequate spillway capacity. Within the service areas, two dams and a reservoir have the potential for flooding: Calavera Dam, which flows into the northern tributary of the Agua Hedionda Creek; Maerkle Dam, which flows into Agua Hedionda Creek;

and the Stanley Mahr Reservoir, which flows into San Marcos Creek. There is also a possibility of catastrophic dam failure inundation associated with these facilities, and the Lake San Marcos Dam, which is located southeast of the study area. These dams are periodically inspected by the State of California Division of Dam Safety. Maerkle Dam is also a potential risk to the portion of the study area in the city of Vista. Henshaw Dam is identified as a potential dam failure hazard to Oceanside; however, the portion of Oceanside within the service areas is not located in the potential inundation area. Likewise, South Lake and Discovery Lake in San Marcos pose a potential dam inundation hazard but the portion of San Marcos in the study area is not within the potential inundation area.

Tsunamis

Tsunamis are long-wavelength, long-period sea waves generated by an abrupt movement of large volumes of water. These waves can be caused by underwater earthquakes, landslides, volcanic eruptions, meteoric impacts, or onshore slope failures. In San Diego, wave heights and run-up elevations from tsunamis have historically fallen within the normal range of tides. Table 4.9-2 gives the years and heights of the largest tsunami events in San Diego. Areas along the coast of San Diego are the most susceptible to potential damage from tsunamis (URS 2004).

Table 4.9-2 Tsunami Heights in San Diego

Year	Height (feet)
1952	2.3
1957	1.5
1960	4.6
1964	3.7

Source: URS 2004

Seiches

A seiche is a standing wave in a completely or partially enclosed body of water. Areas located along the shoreline of a large lake or reservoir are susceptible to inundation by a seiche. High winds, seismic activity, or changes in atmospheric pressure are typical causes of seiches. The size of a seiche and the affected inundation area is dependent on different factors including size and depth of the water body, elevation, source, and if human made, the structural condition of the body of water in which the seiche occurs.

Flood Mapping

The Federal Insurance Rate Map (FIRM) is the official map created and distributed by the Federal Emergency Management Agency (FEMA) and the National Flood Insurance Program (NFIP) that delineates the special flood hazard areas and those areas subject to inundation by the base flood, for every county and community that participates in the NFIP. FEMAs floodplain maps contain flood risk information based on historic, meteorological, hydrologic, and hydraulic data, as well as open-space conditions, flood control works, and development. According to the Carlsbad General Plan, the potential flood hazard areas identified on the FIRM maps include the entire coastline and the following major drainage basins:

1. Buena Vista Creek and Buena Vista Lagoon
2. Agua Hedionda Creek, its northern tributary, and the Agua Hedionda Lagoon

3. San Marcos Creek and its northern tributary
4. Batiquitos Lagoon
5. Encinitas Creek

The Buena Vista Creek bed is also identified as a hazard in the area of Oceanside within the study area. Buena Creek is a potential flood hazard in the portion of the study area in Vista.

4.9.2 Regulatory Framework

4.9.2.1 Federal

Clean Water Act

The 1972 CWA was designed to restore and maintain the chemical, physical, and biological integrity of the waters of the U.S. The CWA also directs states to establish water quality standards for all waters of the U.S. and to review and update such standards on a triennial basis. The EPA has delegated responsibility for implementation of portions of the federal CWA in California to the SWRCB and to the regional water quality control boards (RWQCBs). This includes water quality control planning and programs such as the NPDES, which seeks to protect water quality through the issuance of permits regulating the discharge of pollutants into waters of the U.S. Section 303 of the CWA requires states to adopt water quality standards for all intrastate waters of the U.S.

National Flood Insurance Act

The National Flood Insurance Act of 1968 established the NFIP to provide flood insurance within communities that were willing to adopt floodplain management programs to mitigate future flood losses. The Act also required the identification of floodplain areas within the U.S. and the establishment of flood-risk zones within those areas. FEMA is the primary agency responsible for administering programs and coordinating with communities to establish effective floodplain management standards. FEMA is responsible for preparing FIRMs that delineate the areas of known flood hazards and their risk applicable to the community.

National Flood Insurance Reform Act

The National Flood Insurance Reform Act of 1994 resulted in major changes in the NFIP. The Act, which amended the Flood Disaster Protection Act of 1973, provided tools to make NFIP more effective in achieving its goals of reducing the risk of flood damage to properties and reducing federal expenditures for uninsured properties that are damaged by flood. The Act required mitigation insurance and established a grant program for state and community flood mitigation planning projects.

4.9.2.2 State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act, enacted in 1972, authorizes the SWRCB to adopt, review, and revise policies for all waters of the state (including both surface and ground waters), and directs the RWQCBs to develop region-specific Basin Plans. Section 13170 of the California Water Code also authorizes the SWRCB to adopt water quality control plans on its own initiative. The purpose of these plans is to designate beneficial uses of the region's surface and ground waters, designate water quality

objectives for the reasonable protection of those uses, and establish an implementation plan to achieve the objectives.

Cobey-Alquist Floodplain Management Act of 1965

Under the Cobey-Alquist Floodplain Management Act, local governments are encouraged to plan, adopt and enforce land use regulations for floodplain management, in order to protect people and property from flooding hazards. This Act also identifies requirements that jurisdictions must meet in order to receive state financial assistance for flood control. The Act supports restrictive general plan policies and zoning provisions with respect to floodplain management. Policies and programs providing for protection and prevention of community flood hazards should be incorporated into the safety element of the jurisdiction's general plan. Further, floodways and floodplain boundaries should be designated, and a consistent land use designation given to affected lands in the land use element (including its diagram) of the jurisdiction's general plan.

NPDES Permits

In California, the SWRCB and its RWQCBs administer the NPDES permit program. The NPDES permit system was established in the federal and California CWA to regulate both point-source discharges and nonpoint-source discharges to surface waters of the U.S. The NPDES program consists of characterizing receiving water quality, identifying harmful constituents, targeting potential sources of pollutants, and implementing a comprehensive storm water management program. Construction and industrial activities are typically regulated under statewide general permits that are issued by the SWRCB. The RWQCB also issues Waste Discharge Requirements that also serve as NPDES permits under the authority delegated to the RWQCBs, under the CWA. In November 1990, under Phase I of the urban runoff management strategy, the EPA published NPDES permit application requirements for municipal, industrial, and construction storm water discharges. With regard to municipalities, the permit application requirements were directed at jurisdictions owning or operating municipal separate storm sewer systems (MS4s) serving populations of 100,000 or more, or contributing significant pollutants to waters of the U.S. Such municipalities were required to obtain coverage under an NPDES municipal storm water permit, as well as to develop and implement an urban runoff management program to reduce pollutants in urban runoff and storm water discharges.

Construction Storm Water Permits

In California, storm water runoff from construction activities that result in soil disturbances of one or more acres (and projects that meet other specific criteria) is governed by the SWRCB under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2009-0009-DWQ. General Linear Utility Permits are required for construction of all underground projects over one acre. Construction activity subject to these permits includes clearing, grading and disturbances to the ground. The San Diego RWQCB enforces the Construction General Permit and General Linear Utility Permit for projects located within incorporated and unincorporated areas of San Diego County. The City and/or CMWD is required to obtain coverage under applicable permits prior to commencement of construction activities for CIP projects that would disturb one or more acres. The Construction General Permit and General Linear Utility Permit outline the requirements for preparation of a Storm Water Pollution Prevention Plan (SWPPP) that specifies Best Management Practices (BMP) and monitoring programs if there is a failure of BMPs or if the site discharges directly to a water body on the 303(d) list for sediment. The approved SWPPP must address erosion-control BMPs for both construction and long-term operations on each development site, as required by the Construction General Permit. Such BMPs include, but are not limited to, the following actions:

- Minimize disturbance to existing vegetation and slopes.
- Provide temporary hydroseeding of cleared vegetation and graded slopes as soon as possible following grading activities for areas that will remain in disturbed condition (but will not be subject to further construction activities) for a period greater than two weeks during the construction phase.
- Construct drainage control devices (e.g., storm drains, brow ditches, subdrains) to direct surface water runoff away from slopes and other graded areas.
- Remove sediment from surface runoff before it leaves the construction site through the use of silt fences or other similar devices around the site perimeter.
- Protect storm drain inlets downstream of the construction site to eliminate entry of sediment.
- Prevent off-site tracking of soil through the use of gravel strips or wash facilities at exit areas.
- Protect or stabilize stockpiled soils.
- Implement proper storage, use, and disposal of construction materials.
- Continually inspect and maintain BMPs through the duration of construction.

4.9.2.3 Local

San Diego Basin Plan

The San Diego Basin Plan, most recently amended in 2007, is intended to enhance and preserve water quality and protect the beneficial uses of all regional waters. Specifically, the Basin Plan is designed to accomplish the following: 1) designate beneficial uses for surface and ground waters; 2) set the narrative and numerical water quality objectives that must be attained or maintained to reasonably protect the designated beneficial uses and conform to the state's anti-degradation policy; 3) describe implementation programs to protect the beneficial uses of all waters within the region; and 4) describe surveillance and monitoring activities to evaluate the effectiveness of the Basin Plan. The Basin Plan incorporates by reference all applicable SWRCB and RWQCB water quality control plans and policies.

City of Carlsbad Storm Water Standards Manual

The Carlsbad Storm Water Standards Manual, Volume 4 of the Carlsbad Engineering Standards, is the city's Standard Urban Stormwater Management Plan (SUSMP) and does the following:

1. Accommodates the requirements of the California Regional Water Quality Control Board San Diego Region Order No. R9-2001-01 CAS0108758 Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems Draining the Watersheds of the County of San Diego County, the San Diego Unified Port District, and the San Diego County Regional Airport Authority (Municipal Permit), and California Regional Water Quality Control Board San Diego Region Order No. R9-2007-01 (2007 Municipal Permit);
2. Consolidates construction BMP standards into one location;
3. Clarifies existing standards and incorporates the new standards; and
4. Incorporates the requirements of the General Construction Permit, the General Linear Utility Permit and the General Industrial Activity Permit. The manual consolidates all storm water BMP standards for post construction, construction and business activity requirements into one

comprehensive manual, including hydromodification requirements and Low Impact Development (LID) requirements.

Every construction activity within Carlsbad that has the potential to negatively affect water quality must prepare a construction SWPPP. A SWPPP provides for temporary measures to control sediment and other pollutants during construction as required by the most recent statewide permit regulating construction activities. The SWPPP requirements in the Storm Water Standards Manual ensure compliance with the Carlsbad Storm Water Ordinance. The Water Standards Manual establishes a three-tiered system for the preparation of construction SWPPPs. The tiers range from Tier 3 representing the highest threat to water quality to Tier 1 representing the lowest threat to water quality. The threshold triggers for each of the three tier levels are generally described below.

- **Tier 3** - Construction activities that impact one or more acres (individually or cumulatively through phased construction) or that, regardless of size, pose a significant potential for storm water quality impairment must prepare a Tier 3 Construction SWPPP in conformance with the standards and requirements of the Construction General Permit and City Standards.
- **Tier 2** – Construction activities that impact less than one acre and that pose a moderate threat to storm water quality must prepare a Tier 2 Construction SWPPP in conformance with City Standards. In the case of small linear utility projects, including construction of any conveyance pipe for transportation liquid material, the project must also demonstrate compliance with the General Linear Utility Permit.
- **Tier 1** – Construction activities that impact less than one acre and pose a low threat to storm water quality must prepare a Tier 1 Construction SWPPP in conformance with City Standards. In the case of small linear utility projects, the project must also demonstrate compliance with the General Linear Utility Permit.
- **Exempt** - Construction activities that pose no threat to storm water quality are exempt from the preparation of a Construction SWPPP; however, the construction activities must still comply with all construction BMPs required pursuant to Title 15 of the Carlsbad Municipal Code, Grading and Drainage.

Typical construction BMPs include the following:

- **Minimizing disturbed areas.** Clearing of land is limited to that which will be actively under construction in the near term, new land disturbance during the rainy season is minimized, and disturbance to sensitive areas or areas that would not be affected by construction is minimized.
- **Stabilizing disturbed areas.** Temporary stabilization of disturbed soils is provided whenever active construction is not occurring on a portion of the site, and permanent stabilization is provided by finish grading and permanent landscaping.
- **Protecting slopes and channels.** Outside of the approved grading plan area, disturbance of natural channels is avoided, slopes and crossings are stabilized, and increases in runoff velocity caused by the project is managed to avoid erosion to slopes and channels.
- **Controlling the site perimeter.** Upstream runoff is diverted around or safely conveyed through the project and is kept free of excessive sediment and other constituents.
- **Controlling internal erosion.** Sediment-laden waters from disturbed, active areas within the site are detained.

Projects that would result in the disturbance of one acre or more of land or would create more than 5,000 square feet of impervious surfaces are subject to the post-construction Priority Development Project requirements in the Carlsbad Stormwater Standards Manual and must prepare a Storm Water Management Plan. Projects that are limited to trenching and resurfacing associated with utility work that do not disturb more than one acre are subject to the post-construction Standard Stormwater Requirements. All projects must meet, at a minimum, Standard Stormwater requirements, including the following LID requirements:

- Drain a portion of impervious areas into pervious areas, if any.
- Design and construct pervious areas, if any, to effectively receive and infiltrate runoff from impervious areas, taking into account soil conditions, slope, and other pertinent factors.
- Construct a portion of paved areas with low traffic and appropriate soil conditions with permeable surfaces.

City of Carlsbad Floodplain Management Regulations

The City of Carlsbad addresses flood hazards areas in its Floodplain Management Regulations, Chapter 21.110 of the Carlsbad Municipal Code, which requires a Special Use Permit for any development proposed in areas of special flood hazards and areas of flood-related erosion hazards. The Floodplain Management Regulations restrict or prohibit land uses considered unsafe in a floodplain. They address standards of construction such as anchoring of structures, construction materials and methods, and elevations and flood proofing. Also included are standards for utilities such as water supply lines and sanitary sewage systems.

Developments which do not fall under the Floodplain Management Regulations are also reviewed by the City of Carlsbad Engineering Department for flooding potential. Proposed grading and drainage improvements are analyzed to ensure that drainage is not diverted from its natural drainage basin to another basin that was not designed to take that additional flow.

Oceanside, San Marcos, and Vista Storm Water Requirements

Projects entering into the construction phase of development in Oceanside are required to demonstrate both intended and ongoing compliance with Oceanside Grading and Erosion Control Ordinances, and applicable state Construction General Permit (CGP) requirements, including the General Linear Utility Permit. In addition, projects seeking approval of grading or improvement plans are obligated, by RWQCB and Oceanside regulations, to demonstrate compliance with state requirements for long-term inspection, operation, and maintenance of permanent BMPs through the implementation of a Storm Water Operation and Maintenance Plan (City of Oceanside 2011).

The San Marcos Storm Water Standard Manual provides information to project applicants on compliance with the permanent storm water quality requirements for development projects in San Marcos. The San Marcos Storm Water Management and Discharge Control Ordinance (San Marcos Municipal Code Chapter 14.15) requires that all new development and redevelopment activities comply with the storm water pollution prevention requirements. For projects that do not require discretionary action, City of San Marcos staff will require that SUSMP requirements are incorporated into the project design and shown on the plans prior to issuance of any ministerial permit (City of San Marcos 2008).

The Vista Stormwater Standards Manual and Discharge Control Program Ordinance work in conjunction to establish requirements for potential stormwater discharges. The Manual sets out in more detail, by

project category, what potential dischargers must do to comply with the ordinance and to receive permits for projects and activities that are subject to the ordinance. All potential dischargers engaged in land disturbing construction activities must install, implement and maintain BMPs to prevent or reduce discharges in stormwater from land disturbance activities to the maximum extent practicable. Additional BMPs are required for construction sites that are tributary to 303(d) water body segments that are impaired for sediment.

4.9.3 Project Impacts and Mitigation

4.9.3.1 Issue 1 – Water Quality

Hydrology and Water Quality Issue 1 Summary

Would the Sewer, Water, and Recycled Water Master Plans violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality?

Impact: Compliance with the existing regulations would ensure that construction and operation of the CIP projects would not result in a violation of water quality standards or the degradation of water quality.	**Mitigation:** No mitigation required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Impacts are less than significant without mitigation.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, construction of the CIP projects within the proposed Master Plans would have a significant impact if they violate any water quality standards or waste discharge requirements, or otherwise substantially degrade water quality.

Impact Analysis

The Master Plans would have the potential to contribute to a violation of water quality standards or the degradation of surface water quality from construction, operation, or maintenance of the proposed CIP projects. Table 4.9-1 identifies water bodies in the Carlsbad Hydrologic Unit that are identified as impaired under the Clean Water Act. This table also shows the pollutant(s) underlying such impairment.

Construction Activities

Construction of the CIP projects under the Master Plans could result in polluted runoff through activities such as demolition, clearing and grading, excavation, stockpiling of soils and materials, concrete pouring and painting. This runoff would have short-term adverse impacts on surface water quality. Typically, construction activities involve various types of equipment such as dozers, scrapers, graders, loaders, compactors, dump trucks, water trucks, and concrete mixers. Additionally, soils are typically stockpiled outdoors, in addition to other materials that would be used later during construction. Pollutants associated with these construction activities that would substantially degrade water quality include soils, debris, other materials generated during demolition and clearing, fuels and other fluids associated

with the equipment used for construction, paints, other hazardous materials, concrete slurries, and asphalt materials.

Pollutants associated with construction activities would degrade water quality if they are washed by storm water or non-storm water into surface waters. Sediment is often the most common pollutant associated with construction sites because of the associated earth-moving activities and areas of exposed soil. Sediment that is washed off site can result in turbidity in surface waters, which can impact aquatic species. In addition, when sediment is deposited into receiving water it can smother organisms, alter the substrate and habitat, and alter the drainage course. Hydrocarbons such as fuels, asphalt materials, oils, and hazardous materials such as paints and concrete slurries discharged from construction sites could also impact aquatic plants and animals downstream. Debris and trash could be washed into existing storm drainage channels to downstream surface waters and could impact wildlife as well as aesthetic value. The potential increase in pollutants associated with construction activities could result in a violation in water quality standards or a substantial degradation of water quality.

However, construction of the proposed CIP projects would be subject to the Storm Water General Permit or General Linear Utility Permit requirements, in addition to requirements established by the cities of Carlsbad, Oceanside, Vista, or San Marcos, depending on project location. As described in the discussion of local regulations in Section 4.9.2.3, each city has already adopted regulations that outline specific requirements to ensure compliance with all applicable storm water ordinances. If dewatering is required for any CIP project, dewatering and discharge activities would be subject to water quality guidelines outlined by the NPDES administered by the San Diego RWQCB. Additionally, as discussed in Section 2.6.2 (Project Design Features), the City and CMWD have committed to the following measures to minimize potential water quality impacts:

- A construction spill contingency plan will be prepared for new facilities in accordance with County Department of Environmental Health regulations and retained on site by the construction manager. If soil is contaminated by a spill, the soil will be properly removed and transported to a legal disposal site.
- If groundwater is encountered and dewatering is required, then the groundwater will be disposed of by pumping to the sanitary sewer system or discharging to the storm drain system according to the conditions of the appropriate discharge permit.
- For all trenchless construction activities, the City or CMWD will implement the following methods recommended by the CDFG and USFWS to prevent water pollution:
  - Implementation of the following techniques to reduce potential for hydrofracture and inadvertent returns that could pollute nearby water:
    - Sufficient earth cover will be used to increase resistance to hydrofracture.
    - An adequately dense drilling fluid will be used to avoid travel of drilling fluid in porous sands.
    - The bore will be conducted in a manner that avoids collapse.
    - Borehole pressure will be maintained at levels low enough to avoid hydro fracture.
    - Reaming and pullback rates will be maintained at rates slow enough to avoid over-pressurization of the bore.

    - The surface above the vicinity of the drill head will be visually monitored for surface evidence of hydrofracture.
    - Drilling methods will be modified to suit site conditions such that hydrofracture does not occur.
  - Hydrofractures will be cleaned immediately after they occur. Necessary response equipment will be readily accessible and in good working order.
  - Hydrofracture reporting and cleanup information will be disseminated to construction crews during regular safety meetings. All field personnel will understand their responsibility for timely reporting of hydrofractures.

Compliance with the proposed project features, the Storm Water General Permit, General Linear Utility Permit, and/or local development standards, including the preparation of a SWPPP and/or implementation of applicable BMPs, would reduce the potential increase in pollutants associated with construction activities to a less than significant level.

Operational Activities

Equipment and hazardous materials associated with construction would be removed from construction sites after development of a proposed CIP project is complete, which would reduce the potential for pollutants to be discharged. The majority of the proposed CIP projects are underground pipeline projects or improvements to existing facilities that would not result in a change in existing drainage patterns or new sources of pollutants following completion of construction. However the CIP projects do include some permanent above-ground facilities that would have the potential to create new impervious areas or alter existing drainage patterns that could increase stormwater runoff. These projects are discussed below.

Sewer CIP Projects

Proposed access roads (Sewer CIP Projects SR-19, SR-22, and SR-23) would construct new paved impervious surfaces that would have the potential to alter the existing drainage pattern and increase stormwater runoff. However, as discussed in Section 2.6.2 (Project Design Features), the City and CMWD have committed to the following measures to minimize potential water quality impacts during operation:

- The lead agencies will consider using pervious or semi-pervious surfaces where possible to reduce the increase in the velocity of peak flows.
- For all potential impacts to natural drainages (i.e., pre-development hydrology), BMPs on-site will be used to fully mitigate for project-related contaminants in the surface flows prior to their discharge to streams.

Additionally, these new facilities would be subject to the post-construction stormwater requirements of the City of Carlsbad, which include permanent BMPs and ensure compliance with local and state requirements. California state requirements include compliance with the requirements of the Municipal Separate Storm Sewer System (MS4) permit, which is a system of conveyances designed or used for collecting or conveying storm water that is not a combined sewer or part of a publicly owned treatment works. It includes roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains. These drainage systems typically dump their water (and any

associated pollutants) directly into streams, bays, and/or the ocean. The RWQCB issues an MS4 permit to the public agencies which own and operate MS4s in order to establish the conditions under which pollutants can be discharged from the storm drain system to local streams, coastal lagoons, and the ocean. The MS4 permit implements requirements of the CWA and Federal NPDES storm water regulations. Since 1990, permits have been issued to municipalities based on their county location. The MS4 permit requires the County and the municipalities to adopt and enforce storm water management programs and measures to:

(a) Identify major outfalls and pollutant loadings (e.g., determine through testing and other methods where pollutants entering the MS4 are coming from);

(b) Detect and eliminate all non-storm water discharges to the system, except as specifically exempted (e.g., this is accomplished through the enforcement of ordinances adopted to prohibit non-storm water discharges to the system);

(c) Prevent and reduce pollutants in runoff from industrial, commercial, and residential areas through the implementation of BMPs (e.g., Best Management Practices prescribed by ordinances);

(d) Control storm water discharges from new development and redevelopment (e.g., through ordinances and by RWQCB under the Construction Storm Water General Permit);

(e) Inspect industrial, commercial, and construction activities;

(f) Provide pertinent education and promote public reporting of pollution;

(g) Monitor discharges and impacts on receiving waters.

The MS4 permit covering the local jurisdictions in which portions of the City's service area are located, require the development of a hydromodification management plan. Pursuant to the 2007 Municipal Permit, a hydromodification management plan must be prepared with the purpose of managing increases in runoff discharge rates and durations from specific projects, where such increased rates and durations are likely to cause increased erosion of channel beds and banks, sediment pollutant generation, or other impacts to beneficial uses and stream habitat due to increased erosive force.

Additionally, construction of CIP projects proposed in the Sewer Master Plan would be constructed to ensure city facilities meet existing and projected future demand in a reliable manner, including the installation of facilities with adequate capacity to avoid or minimize sewer overflow events and the availability of adequate wastewater treatment capacity to ensure NPDES and Waste Discharge Requirements are met. Therefore, the Sewer Master Plan would not result in a violation of waste discharge requirements from operation and impacts would be less than significant.

Water CIP Projects

Construction of a new pressure regulating station (PRS) at El Fuerte Street/Corintia Street (Water CIP Project 21), a new emergency pump station at Obelisco Place/Circle (Water CIP Project F14), a new building at Calavera Pump Station (Water CIP Project PS1), and a groundwater treatment plant (Water CIP Project 52) would have the potential to result in new impervious surfaces. However, CMWD has also committed to the project design features listed in above under Sewer CIP projects. Additionally, these new facilities would be subject to the post-construction stormwater requirements of the City of Carlsbad and the City of Oceanside (Water CIP Project 51), which include permanent BMPs and ensure compliance with local and state requirements. State requirements include compliance with the

requirements of the MS4 permit, as described above under Sewer CIP projects. The MS4 permit requires the development of a hydromodification management plan for the purpose of managing increases in runoff discharge rates and durations from specific projects. Therefore, the Water Master Plan would not result in a violation of waste discharge requirements from operation and impacts would be less than significant.

Recycled Water CIP Projects

The Recycled Water Master Plan does not include any CIP projects that would result in new impervious surfaces. Therefore, the Recycled Water Master Plan would not increase runoff and would not result in a violation of waste discharge requirements from operation. Impacts would be less than significant.

Mitigation Measures

Impacts related to violations of water quality standards and surface water quality degradation would be less than significant. No mitigation is required.

Significance After Mitigation

Impacts related to violations of water quality standards and surface water quality degradation would be less than significant without mitigation.

4.9.3.2 Issue 2 – Alteration of Drainage Patterns

Hydrology and Water Quality Issue 2 Summary

Would the Sewer, Water, and Recycled Water Master Plans substantially alter existing drainage patterns, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would provide substantial additional sources of polluted runoff (including erosion/siltation); result in flooding (and exposure of people or structures to a significant risk of loss, injury or death); or exceed the capacity of storm water drainage systems?

Impact: Construction and operation of CIP projects would not result in the alteration in drainage patterns, increased polluted runoff, flooding or an exceedence in the capacity of a storm water drainage facility.	**Mitigation:** No mitigation required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Impacts are less than significant without mitigation.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the Master Plans would have a significant impact if it would substantially alter existing drainage patterns, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would provide substantial additional sources of polluted runoff (including erosion/siltation); result in flooding (and exposure of people or structures to a significant risk of loss, injury or death); or exceed the capacity of storm water drainage systems.

Impact Analysis

Additional Sources of Polluted Runoff/Erosion/Siltation

Land-disturbing construction activities for proposed Master Plans CIP projects, such as grading, trenching, excavation, or the construction of access roads and new structures, have the potential to result in localized temporary or permanent alteration of drainage patterns. This can lead to indirect effects on sensitive biological resources downstream of the proposed CIP project site including the deposition of pollutants and sediment to the watershed outlets, an increase in polluted runoff to surface receiving bodies, and an increase in the flood potential downstream. Upon completion of the new above-ground facilities (Sewer CIP Projects SR-19, SR-22, and SR-23; and Water CIP Projects 21, F14, PS1, and 52), a permanent increase in impervious surface would occur on each proposed project site. The increase in impervious surfaces could increase runoff and potentially result in new erosion problems or the worsening of existing erosion problems. However, as discussed under Issue 1, project design features and existing state and local regulations are in place to ensure that impacts to water quality from new sources of polluted runoff would not occur, including increases in sediment runoff. These regulations require the implementation of permanent BMPs, including LID and hydromodification requirements, that minimize disturbance, protect slopes and reduce erosion. Compliance with existing regulations would reduce the potential increase in polluted runoff, erosion and siltation associated with construction and the post-construction increase in impervious surfaces to a less than significant level. Therefore, construction and operation activities associated with implementation of the Master Plans would not substantially alter drainage patterns and would not increase erosion and siltation.

Flooding

Land-disturbing construction activities, such as grading, excavation, and the construction of access roads, could result in the localized alteration of drainage patterns. Temporary ponding and/or flooding could result from construction activities, from temporary alterations of the drainage system (reducing its capacity of carrying runoff), or from the temporary creation of a sump condition due to grading. The construction of new CIP facilities and access roads on previously undeveloped areas would also result in increased impermeable surfaces, which have the potential to create a diversion from the natural runoff pattern in a manner that would have the potential to result in flooding. However, construction and operation of the CIP projects would be required to comply with existing regulations that reduce the likelihood of alterations in drainage to result in flooding impacts, such as those listed above in Issue 1. Through compliance with existing local and state regulations, including implementation of construction and post-construction BMPs, construction and operational activities associated with Master Plans CIP projects would not increase the rate and amount of surface runoff to streams and rivers in a manner which would result in flooding on or off site, and would not expose CIP facilities to a significant risk of loss.

Exceeding the Capacity of Storm Water Drainage Systems

Drainage facilities including storm drains, culverts, inlets, channels, curbs, roads, or other such structures are designed to prevent flooding by collecting storm water runoff and directing flows to either the natural drainage course and/or away from development. If drainage facilities are not adequately designed, built, or properly maintained, the capacity of the existing facilities can be exceeded resulting in flooding and increased sources of polluted runoff. As stated above, the Master Plans CIP projects would have the potential to result in alterations of drainage patterns during construction and post-construction due to an increase in the rate or amount of surface runoff. This alteration in drainage patterns and increase in runoff could exceed the capacity of existing or planned

on-site and off-site storm water drainage systems. Storm water discharges are generated by precipitation and runoff from land, structures, and other surfaces. Substantial increased runoff volumes would have the potential to overload existing drainage facilities and increase flows and velocity which could result in flooding, increased erosion, and impacts to downstream receiving waters and habitat integrity. However, the Master Plans CIP projects have relatively small development footprints and would not be expected to contribute runoff in a manner that would exceed the storm drainage capacity. Additionally, as discussed under Issue 1, construction and operation of the CIP projects would be required to comply with state and local stormwater regulations, including construction and post-construction BMPs and LID, which reduce the likelihood of runoff exceeding the capacity of an existing storm water drainage system. Additionally, at the time of CIP project design for above-ground facilities, City and CMWD would implement the relevant requirements of the 2010 CBC), including the design of appropriately sized drainage facilities, where necessary, to capture runoff from each project site in a manner that would reduce flooding. Therefore, through compliance with the existing regulations, the Master Plans would not increase runoff in volumes that would exceed pre-project site conditions and would not exceed the capacity of existing storm water drainage systems. Impacts would be less than significant.

Mitigation Measures

Impacts related to additional sources of polluted runoff, flooding or exceeding the capacity of storm water drainage systems would be less than significant. No mitigation is required.

Significance After Mitigation

Impacts related to additional sources of polluted runoff, flooding or exceeding the capacity of storm water drainage systems would be less than significant without mitigation.

4.9.3.3 Issue 3 – Mudflows, Dam Inundation, Tsunamis and Seiches

Hydrology and Water Quality Issue 3 Summary

Would any of the CIP projects under the Sewer, Water, and Recycled Water Master Plans be exposed to a significant risk of loss by a mudflow, tsunami, seiche, or flooding due to dam inundation or result in flooding due to facility failure?

Impact: The CIP projects would not be exposed to significant risks related to mudflows, dam inundations, tsunamis, or seiches.	**Mitigation:** No mitigation is required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Impacts are less than significant without mitigation.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, the Master Plans would have a significant impact if it would expose above-ground CIP structures to a significant risk of loss involving inundation by mudflow, tsunami, seiche or dam failure.

Impact Analysis

Mudflow

Debris flows, also known as mudflows, are shallow water-saturated landslides that travel rapidly down slopes carrying rocks, brush, and other debris. The sewer, water, and recycled water service areas contain many areas with steep slopes, or mountainous areas, that would potentially be subject to mudflows in the event of large amounts or precipitation. The Master Plans do not propose housing or buildings for human occupancy; therefore, life loss would not occur in the event of a mudflow. In the event of a mudflow, CIP projects that include above-ground facilities such as PRS, lift and pump stations, or treatment facilities would have the potential to be at risk of structure loss. However, as described in Section 2.6.2, Project Design Features, a site specific geotechnical investigation would be completed during the engineering and design of CIP projects that would require excavation in previously undisturbed soil that would identify and make recommendations for any site-specific hazards, including mudflows. The geotechnical study would adequately assess geotechnical issues, including mudflow potential and would include sampling of subsurface earth materials. If such materials are found to be susceptible to mudflows, then appropriate techniques to minimize this potential would be designed and implemented, including but not limited to, remedial grading, slope stabilization in areas of proposed development, or construction of buttress fills to remediate the potential for instability of cut slopes. Therefore, potential exposure of CIP facilities to substantial adverse effects associated with potential mudflows would be less than significant.

Flooding from Dam Inundation

Dam inundation areas potentially affecting the sewer, water, and recycled water service areas surround the Calavera Dam, Maerkle Dam, Mahr Reservoir, and Lake San Marcos Dam. All dams have inundation area maps and emergency plans for areas within inundation areas. In the event of a dam failure, proposed CIP facilities throughout the study area are located with the potential inundation areas. If above-ground facilities are flooded, facility failure would potentially occur. Impacts related to facility failure are discussed below. Due to the dispersed location of each CIP facility, a dam inundation event would likely impact only a few, if any, above-ground CIP facilities and would not result in a substantial loss of Master Plan structures or facilities. Additionally, no Master Plans CIP projects involve housing or structures for human occupancy. Therefore, a dam inundation event would not result in injury or death related to proposed CIP projects. This impact would be considered less than significant.

Flooding from Facility Failure

The failure of a proposed CIP project could occur as a result of structural damage caused by a natural event, such as earthquakes or flooding, or equipment failure from age or material defect. Facility failure could result in flooding caused by the release of impounded water in water storage reservoirs, pump stations, lift stations or pipelines. The failure of a tank, pump, lift station, PRS or pipeline could be extremely hazardous, as it would occur quickly and without warning. Areas directly surrounding the facility would be at the greatest risk. Flooding from facility failure could discharge raw sewage, inundate and cause water damage to structures, bury structures, knock structures off their foundations, or completely destroy structures by the impact of high velocity water and debris, which could include sizable boulders. Impacts resulting from flooding could include the loss of life and/or property; health and safety hazards; disruption of commerce, water, power, and telecommunications services; loss of agricultural lands; and infrastructure damage.

However, the CIP projects would make improvements to existing facilities, including replacement of aging pipelines, which would improve the existing system's susceptibility to failure. All projects would comply with the CBC, as applicable, to minimize reasonably foreseeable risk from seismic events. The City and CMWD routinely perform inspection and maintenance on all facilities. The CIP projects would be incorporated into the maintenance schedules. Additionally, Carlsbad maintains a Sewer System Management Plan to prevent facility failure and overflow response programs to respond to facility failures, in compliance with statewide general waste discharge requirements for sanitary sewer systems. The Sewer System Management Plan includes an overflow emergency response plan, as well as plans for system evaluation, monitoring, and control of fats, oils, and greases that can damage the sewer system. Implementation of these programs reduces the risk associated with facility failure to a level below significance.

Tsunami

A tsunami is a very large ocean wave caused by an underwater earthquake or volcanic eruption. Tsunamis can cause flooding to coastlines and inland areas less than 50 feet above sea level and within one mile of the shoreline. Many CIP projects would be located within one mile of the coastline. However, most projects would be underground pipelines. The above-ground facilities located closest to the coastline include Sewer CIP Projects SR-2, SR-16, and E-1/E2. However, these CIP projects would make improvement to existing structures and would not result in new facilities at risk for tsunami hazards. Therefore, the Masters Plan CIP projects would not be exposed to a significant risk from a tsunami. Impacts would not be considered significant.

Seiche

A seiche is a standing wave in a completely or partially enclosed body of water. Although water bodies exist within the sewer, water, and recycled water service areas, such as Calavera Reservoir, Maerkle Reservoir, and Mahr Reservoir, these are not large enough to be subject to seiches. Some overtopping of these reservoirs may occur; however, impacts would be limited to the area surrounding the reservoir. The specific CIP projects that may be affected by seiches are discussed below.

Sewer CIP Projects

The Sewer Master Plan does not include any CIP projects related to water storage and does not place any new structures in areas at risk for seiches. Impacts related to seiches are considered less than significant.

Water CIP Projects

Water CIP Project R3 would replace the existing aging cover on the Maerkle Reservoir, and CIP Project R4 would make improvements to reservoirs throughout the CMWD service area, which would reduce flooding risk. There are above-ground CIP projects proposed in the vicinity of Maerkle Reservoir, including Water CIP Project R7, which would replace joint sealant in an existing tank and adding security lights and cameras at Maerkle Reservoir; and CIP Project PS4, which would add an additional pump to the Maerkle Pump Station. However, Maerkle Reservoir is covered and would be upgraded with implementation of CIP Project R3. Flooding risk would be minimal. Impacts related to seiches are less than significant.

Recycled Water CIP Projects

Recycled Water CIP Projects P76, P77, and P79 would rehabilitate existing recycled water storage facilities. Rehabilitation would reduce potential flooding impacts. Impacts related to seiches are considered less than significant.

Mitigation Measures

Impacts related to mudflows, dam inundations, tsunamis, and seiches would be less than significant. No mitigation is required.

Significance After Mitigation

Impacts related to mudflows, dam inundations, tsunamis, and seiches would be less than significant without mitigation.

4.9.3.4 Issue 4 – Flood Hazard Areas

Hydrology and Water Quality Issue 4 Summary

Would the Sewer, Water, and Recycled Water Master Plans place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

Impact: The Master Plans do not propose housing in a flood hazard area.	**Mitigation:** No mitigation required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Impacts are less than significant without mitigation.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the Master Plans would have a significant impact if it would place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.

Impact Analysis

Portions of the sewer, water, and recycled water service areas are located within a 100-year floodplain or floodway. The Master Plans do not include the provision of any housing; therefore, the Master Plans would not place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or FIRM or other flood hazard delineation map. No impact would occur.

Mitigation Measures

Impacts related to flood hazard areas would be less than significant. No mitigation is required.

Significance After Mitigation

Impacts related to flood hazard areas would be less than significant without mitigation.

4.9.3.5 Issue 5 – Groundwater

Hydrology and Water Quality Issue 5 Summary

Would the Sewer, Water, and Recycled Water Master Plans substantially degrade groundwater quality, or interfere substantially with groundwater supplies or recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table?

Impact: Construction and operation of CIP projects would not substantially degrade groundwater quality or interfere substantially with groundwater supplies or recharge.	**Mitigation:** No mitigation required.
Significance Before Mitigation: Less than significant.	**Significance After Mitigation:** Impacts are less than significant without mitigation.

Standards of Significance

Based on Appendix G of the CEQA Guidelines, implementation of the Master Plans would have a significant impact if it would substantially degrade groundwater quality, or interfere substantially with groundwater supplies or recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table.

Impact Analysis

Although some of the proposed CIP projects may be constructed above or adjacent to groundwater basins, these projects would not affect groundwater recharge because they would not involve the extraction or use of groundwater supplies, with the exception of Water CIP Projects 51 and 52. Further, each proposed CIP project would comply with all applicable construction storm water permits, which require the implementation of construction and post construction BMPs, as described above in Issue 1 and Issue 2. Compliance with the construction permits would reduce the potential for the Master Plans to substantially interfere with groundwater quality to a less than significant level. The construction and operation of the proposed CIP projects would not use groundwater and would not directly affect groundwater levels. Dewatering, a method which pumps groundwater into either a surface water body or directly into a stormwater drainage system, may be required to prepare sites for placement of proposed pipelines and other underground facilities; however, the potential impact to groundwater would be temporary and would not substantially deplete groundwater supplies. Further, most CIP projects would not result in any increase in impervious surfaces and the few new structures would have small sized footprints and would not interfere with groundwater recharge by increasing impervious surfaces in a manner that would result in a net deficit in aquifer volume or a lowering of the local groundwater table level. Therefore, a less than significant impact would occur as a result of the proposed CIP projects, with the exception of Water CIP Projects 51 and 52, which are discussed below.

Water CIP Projects

Water CIP Projects 51 and 52 would make groundwater available for potable water use in the CMWD service area. CMWD currently does not use any local groundwater or surface water supplies. Of the groundwater basins available to CMWD, the Mission Basin of the San Luis Rey River groundwater basin has the most potential to be a viable water resource. A groundwater supply from the Mission Basin would require the construction of several wells, a groundwater treatment facility, and a conveyance system. Water CIP Project 52 is proposed to include the planning, design, and potential implementation of a small well water supply and treatment project. Details of the project, including selection of the most advantageous groundwater basin for development, would be determined during project planning. Water CIP Project 51 also proposes well water supply facilities in Rancho Carlsbad in the Agua Hedionda subunit of the San Luis Rey River basin. It is not known at this time the quantity of water that would be extracted as a result of these CIP projects. CMWD currently has groundwater rights to extract groundwater from the San Luis Rey River basin and the California Department of Water Resources does not identify this groundwater basin as being in overdraft (Atkins 2011). Groundwater rights are based on the potential available yield of the basin. The CMWD would be required to limit groundwater extraction to within its entitlement for the San Luis Rey River groundwater basin. The Water Master Plan acknowledges that due it its low potential yield, if there is excessive pumping at the proposed Rancho Carlsbad facility, there may be adverse effects, such as the elimination of surface flow in Agua Hedionda Creek, reduction in the wetland area downstream of the El Camino Real bridge, and increased salinity in the transition zone of fresh water to salt water in the Agua Hedionda Lagoon. These problems would be addressed through a program of scheduled observations and a monitoring program. Therefore, implementation of CIP Projects 51 and 52 would not substantially interfere with groundwater supplies or recharge. Similar to the other CIP projects, compliance with all applicable storm water permits would reduce potential water quality impacts to a less than significant level. Impacts related to groundwater would be less than significant.

Mitigation Measures

Impacts related to groundwater would be less than significant. No mitigation is required.

Significance After Mitigation

Impacts related to groundwater would be less than significant without mitigation.

4.9.4 Cumulative Impacts

Hydrology and Water Quality Cumulative Issue Summary

Would implementation of the Sewer, Water, and Recycled Water Master Plans have a cumulatively considerable contribution to a cumulative Hydrology and Water Quality impact considering past, present, and probable future projects?

Cumulative Impact	Significant?	Project Contribution
Regional increase in pollutant sources that could adversely affect water quality standards.	Yes	Not cumulatively considerable.
Regional impacts to alteration of localized drainage patterns that can result in increased polluted runoff, flooding, and exceedance of capacity of storm water drainage facilities due to alteration of localized drainage patterns.	Yes	Not cumulatively considerable.
Exposure to mudflows, Dam Inundation, Tsunamis and Seiches	No	Not cumulatively considerable.
Exposure to flood hazard areas.	No	Not cumulatively considerable.
Regional impacts to groundwater use that would substantially degrade groundwater quality or interfere with supplies and recharge.	Yes.	Not cumulatively considerable.

4.9.4.1 Water Quality

The geographic context for the analysis of cumulative impacts relative to water quality standards encompasses the ~~portions of the~~ Carlsbad watershed ~~directly downstream from the CIP project locations~~. Land disturbance and development activities are expected to continue in the vicinity of the watershed. Even with the promulgation of storm water regulations, land disturbance and development activities throughout these watersheds continue to contribute to the overall water quality problems observed in runoff flows that discharge into watercourses, lagoons, and eventually the Pacific Ocean. Additionally, sewer system overflows from past cumulative projects exacerbate water quality issues in the Carlsbad watershed. As shown in Table 4.9-1, the water bodies in the Carlsbad Watershed have been placed on the CWA 303(d) list. As indicated by their 303(d) list status, a significant cumulative impact to the Carlsbad watershed (i.e., regional cumulative impact area) has already occurred as a result of development of past cumulative projects and other factors such as unauthorized discharges of contaminates. Based upon the existing impaired status of these water bodies, future cumulative projects have the potential to worsen this cumulative impact. As discussed above in Section 4.9.3.1, the Master Plans would comply with the Construction General Permit and all other applicable storm water requirements, which would ensure that the proposed CIP projects associated with the Master Plans would not contribute to the further degradation of water quality from increased runoff, sedimentation or unauthorized pollutant releases. Following construction, the CIP projects would not result in new sources of pollutants and generally would not result in a change to the existing site drainage pattern. The few proposed new structures would be required to comply with post-construction BMPs such as LID that would ensure significant impacts would not occur. Therefore, construction and operation activities

associated with the CIP projects would not result in a cumulatively considerable contribution to the cumulatively significant increase in downstream water pollution effects within the regional area.

4.9.4.2 Alteration of Drainage Patterns

The geographic context for the analysis of various cumulative water quality and hydrological impacts relative to localized alteration of drainage patterns encompasses the ~~portions of~~ Carlsbad watershed ~~directly downstream from the proposed CIP projects~~. Land disturbance and development activities are expected to continue in the watershed. Even with the promulgation of storm water regulations, land disturbance and development activities throughout these watersheds and basins continue to contribute to the overall surface quality and flooding problems in the service area and in the downstream watercourses and lagoons leading to the Pacific Ocean. Therefore, the baseline cumulative impact to the Carlsbad watershed due to water quality and flooding effects from discharges of storm water associated with alterations of drainage patterns is significant. As discussed in Section 4.9.3.2 above, the Master Plans would generally not result in permanent impacts to existing drainage patterns and would comply with all applicable storm water requirements, which would reduce impacts related to drainage alteration, flooding, and exceedance of capacity of storm water drainage facilities to a level below significance. The Master Plans would not result in a cumulatively considerable contribution to the cumulatively significant regional alteration of drainage patterns.

4.9.4.3 Mudflows, Dam Inundation, Tsunamis and Seiches

Impacts relative to mudflows, dam inundation, tsunamis, and seiches, are generally specific to a project site; this issue is not subject to a cumulative impact analysis. Location of one project in a hazard area would not affect whether or not another project would be located in a hazard area. The Master Plans, in combination with other cumulative projects, would not result in a cumulatively significant impact related to mudflows, dam inundation, tsunamis, and seiches.

4.9.4.4 Flood Hazard Areas

Impacts relative to flood hazards are generally specific to a project site; this issue is not subject to a cumulative impact analysis. Location of one project in a hazard area would not affect whether or not another project would be located in a hazard area. The Master Plans, in combination with other cumulative projects, would not result in a cumulatively significant impact related to flood hazard areas.

4.9.4.5 Groundwater

The geographic context for the analysis of various cumulative water quality and hydrological impacts relative to localized alteration of drainage patterns encompasses the San Luis Rey River groundwater basin. Groundwater is anticipated to supply a greater source of potable water in the future as technology makes groundwater more economically feasible and as other water sources become less reliable. Cumulative growth in the region would have the potential to increase groundwater use. If new wells would be over pumped, overdraft would occur. Additionally, development is expected to increase the amount of impervious surface in the basin, which would have the potential to substantially interfere with groundwater recharge. Therefore, a potentially significant cumulative impact to the San Luis Rey River groundwater basin would occur. As discussed in Section 4.9.3.5 above, the Master Plans would generally not result in permanent impacts groundwater supply or recharge. However, Water SIP

Projects 51 and 52 would result in groundwater pumping for potable water use. Pumping as a result of these projects would be within the CMWD's existing groundwater entitlement and CMWD would address potential overdraft through a program of scheduled observations and a monitoring program. Implementation of CIP projects would not result in a cumulatively considerable contribution to a potentially significant cumulative impact.

4.9.5 References

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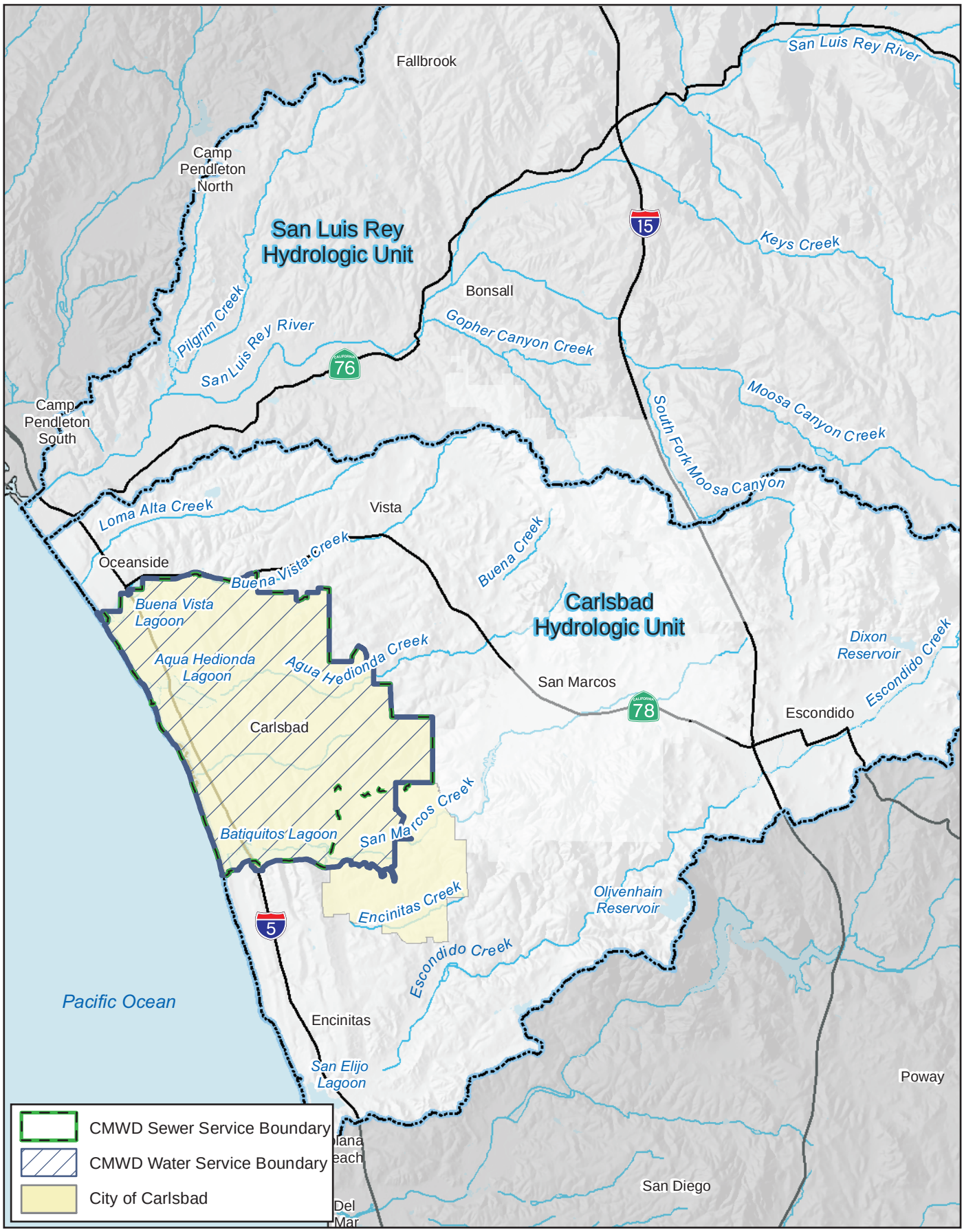

Source: USGS 2009; CASIL 2009; SanGIS 2010

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CARLSBAD HYDROLOGIC UNIT
FIGURE 4.9-1

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